



(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

17.07.2002 Bulletin 2002/29

(51) Int Cl.7: H04L 1/06

(21) Application number: 01307260.8

(22) Date of filing: 28.08.2001

(84) Designated Contracting States:

AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR

Designated Extension States:

AL LT LV MK RO SI

(30) Priority: 29.12.2000 US 752637

(71) Applicant: LUCENT TECHNOLOGIES INC.

Murray Hill, New Jersey 07974-0636 (US)

(72) Inventors:

- Foschini, Gerard J.
Sayreville, New Jersey 08879 (US)
- Papadias, Constantinos B.
Westfield, New Jersey 07090 (US)

(74) Representative:

Buckley, Christopher Simon Thirsk et al
Lucent Technologies NS UK Limited,
Intellectual Property Division,
5 Mornington Road
Woodford Green, Essex IG8 0TU (GB)

(54) Open-loop diversity technique for systems employing four transmitter antennas

(57) When using four transmit antennas, conventional channel coding is employed for a decoupled space-time coding approach for each of a number, L , of data substreams derived from the overall source bit stream. The symbols of the data substreams, after any encoding, are processed and the resulting derivatives of the encoded data substreams, which includes at least the complex conjugate of one of the encoded symbols, are grouped to form four transmit time sequences each one spanning L symbol periods which form a transmission matrix \mathbf{B} . Each row of the matrix corresponds to an antenna, and the elements of each row represent the samples of a temporal sequence that is emitted by the antenna in L symbol periods. When $L=4$ the matrix \mathbf{B}

can be arranged as follows:

$$\begin{array}{l}
 \text{Antenna 1} \\
 \text{Antenna 2} \\
 \text{Antenna 3} \\
 \text{Antenna 4}
 \end{array}
 \begin{array}{c}
 T_1 \quad T_2 \quad T_3 \quad T_4 \\
 \left[\begin{array}{cccc}
 b_1 & b_2^* & b_3 & b_4^* \\
 b_2 & -b_1^* & -b_4 & b_3^* \\
 b_3 & b_4^* & -b_1 & -b_2^* \\
 b_4 & -b_3^* & b_2 & -b_1^*
 \end{array} \right]
 \end{array}$$

where b_1 , b_2 , b_3 , and b_4 are the encoded symbols from the data substreams and * indicates complex conjugate.

FIG. 1

